

Our Reference: 200208977-1

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Appellants: Makarand Gore et al.
Serial Number: 10/807,887
Filing Date: March 24, 2004
Confirmation No.: 5355
Examiner/Group Art Unit: Kevin M. Picardat/2822
Title: METHOD FOR FORMING A CHAMBER IN AN
ELECTRONIC DEVICE AND DEVICE
FORMED THEREBY

APPEAL BRIEF

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I. REAL PARTY IN INTEREST

The real party in interest is Hewlett-Packard Development Company, L.P., a limited partnership established under the laws of the State of Texas and having a principal place of business at 20555 S.H. 249, Houston, Texas 77070, U.S.A. (hereinafter "HPDC"). HPDC is a Texas limited partnership and is a wholly-owned affiliate of Hewlett-Packard Company, a Delaware Corporation, headquartered in Palo Alto, CA. The general or managing partner of HPDC is HPQ Holdings, LLC.

II. RELATED APPEALS AND INTERFERENCES

Appellants and the undersigned attorneys are not aware of any appeals or any interferences which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

III. STATUS OF CLAIMS

Claims 1-16 and 24-31 are the claims on appeal. See, Appendix.

Claims 17-23 and 32-40 were cancelled.

Claims 1-16 and 24-31 were rejected under 35 U.S.C. § 102(b) as being anticipated by Zappella et al. (U.S. Patent No. 6,297,069) (referred to hereinafter as "Zappella").

IV. STATUS OF AMENDMENTS

In response to the Final Office Action of August 9, 2007, no amendment pursuant to 37 C.F.R. § 1.116 was filed.

V. SUMMARY OF CLAIMED SUBJECT MATTER

In this summary of claimed subject matter, all citations are to the specification of United States Patent Application 10/807,887. Further, all citations are illustrative, and support for the cited element may be found elsewhere in the specification.

Independent claim 1:

One embodiment provides a method for forming a chamber in an electronic device. The method includes preparing an outer surface on a solidified bifunctional core material, the solidified bifunctional core material in a depression formed in a substrate. The method further includes establishing a layer on the prepared outer surface of the solidified bifunctional core material and a portion of the substrate surrounding the depression, the established layer and the substrate defining a chamber. (See page 2, line 28 through page 3, line 19; page 6, lines 22 through 31; page 7, line 14 through 24; and page 9, line 10 through page 11, line 10.)

Independent claim 24:

Another embodiment is a process for making an optical microelectromechanical device. The process includes introducing a bifunctional core material into a cavity defined in a substrate, and establishing a layer on the bifunctional core material and the substrate, the layer and substrate defining a sealed chamber therebetween. (See page 2, line 28 through page 3, line 19; page 6, lines 22 through 31; page 7, line 14 through 24; and page 9, line 10 through page 11, line 10).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Whether claims 1-16 and 24-31 are unpatentable under 35 U.S.C. §102(b) as being anticipated by Zappella.

VII. ARGUMENTS

Rejection of claims 1-16 and 24-31 under 35 U.S.C. § 102(b)

Claims 1-16 and 24-31 were rejected under 35 U.S.C. § 102(b) as being anticipated by Zappella in the Final Office Action dated August 9, 2007. The Examiner states that Zappella discloses a method of forming an electronic device having a chamber. According to the Examiner, Zappella teaches preparing an outer surface on a solidified bifunctional core material in a depression formed in a substrate by applying a supporting material to a cavity of a substrate and curing the material. The Examiner also states that Zappella discloses establishing a layer on the outer surface and on a portion of the substrate surrounding the depression.

In his arguments, the Examiner states that Appellants' claims do not distinguish any specific surface, and thus the steps of Zappella's Figure 10 read on the claims. In particular, the Examiner states that Zappella discloses applying a supporting material to a cavity and curing the material, thereby preparing the surface. The Examiner then states that the prepared surface is the surface exposed after the removal of Zappella's structure from the work surface. The Examiner concludes that it is upon this prepared surface and that a layer is established.

At the outset, the Appellants submit that, in discussing Zappella, the Examiner refers to both a substrate surface 12 (i.e., the exposed surface after removal from the work surface) and a cured material in the cavity (defined in an opposed surface 14) as prepared outer surfaces. Assuming *arguendo* that both surfaces are in fact prepared outer surfaces, it is submitted that neither of these prepared outer surfaces has a layer established thereon in such a manner so as to form a chamber (as recited in Appellants' claims 1 and 24). As such, Appellants strongly disagree with the conclusions of the Examiner.

Appellants' claim 1 recites:

A method for forming a chamber in an electronic device, the method comprising:

preparing an outer surface on a solidified bifunctional core material, the solidified bifunctional core material in a depression formed in a substrate; and

establishing a layer on the prepared outer surface of the solidified bifunctional core material and a portion of the substrate surrounding the depression, the established layer and the substrate defining a chamber.

Appellants' figures further illustrate the method as recited in claim 1, which clearly includes 1) preparing the outer surface 336 of the solidified bifunctional core material 334 (see Appellants' Figs. 3B and 3C, reproduced below), which is in the depression formed in the substrate 314; and 2) establishing the layer 338 on the prepared outer surface 336 of the solidified bifunctional core material 334 and on a portion 318 of the substrate 314 surrounding the depression, the established layer 338 and the substrate 314 defining a chamber 350 (see Appellants' Fig. 3D, reproduced below, which depicts the removal of the bifunctional core material 334).

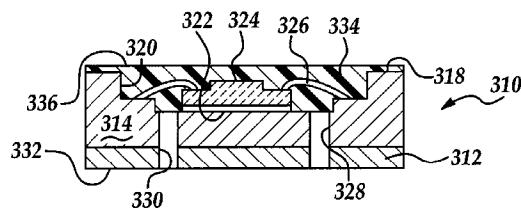


FIG. 3B

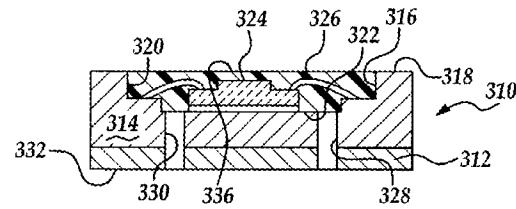


FIG. 3C

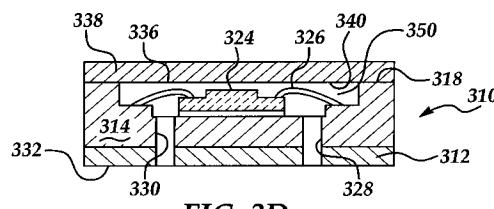


FIG. 3D

Appellants submit that claim 1 does set forth the specific surfaces (i.e., the prepared outer surface of the core material and the substrate surface surrounding the depression) upon which the layer 338 is established. Appellants further submit that the Examiner is misinterpreting the teachings of Zappella. Appellants agree that both their claim 1 and the method disclosed in Zappella include the deposition or establishment of at least two layers on a substrate. However, the arrangement of the deposited or established layers is **different**, where one configuration results in the formation of a chamber (i.e., Appellants' claim 1), and the other configuration results in the formation of a planar layer on a substrate surface (i.e., Zappella).

Zappella discloses that a support material is applied to the substrate as **two separate layers** at **two separate locations**. The first support material layer is applied about the perimeter of a **first surface** of the substrate. The second support material layer is applied to a cavity formed into a **second surface** of the substrate. (See Fig. 3, Fig. 4A (showing the material in the cavity) and Fig. 6A (showing the material about the perimeter); Col. 7, lines 14-17, 64-67; and Col. 8, lines 1-8).

Fig. 10 of Zappella, relied upon by the Examiner to support his conclusions, further teaches a method in which **two different layers** are established on or in **two different surfaces** of the substrate. Appellants have reproduced below Figs. 11A, 8A and 8B of Zappella to assist in the discussion of the method of Fig. 10.

Zappella's method, in part, includes:

- 1) Placing the first surface 12 of the substrate 10 (added for clarification to Fig. 11A below) on the backing sheet 44 and work surface 42;
- 2) Applying a supporting material 32 to 1) a cavity in the substrate 10, and 2) **about the periphery** of the substrate 10.

Per step 2, some of the supporting material 32 fills the cavity, and some of the supporting material 32 abuts the substrate 10 near its first surface 12. As stated in Zappella, at Col. 11, lines 34-37, "the contact between the supporting material 32 and the work surface 42 forms a surface 38 (shown in Figs. 8A and 8B, reproduced below) of the supporting material 32 that is coplanar with the first surface 12 of the micro-electronic substrate 10" (emphasis and explanation added).

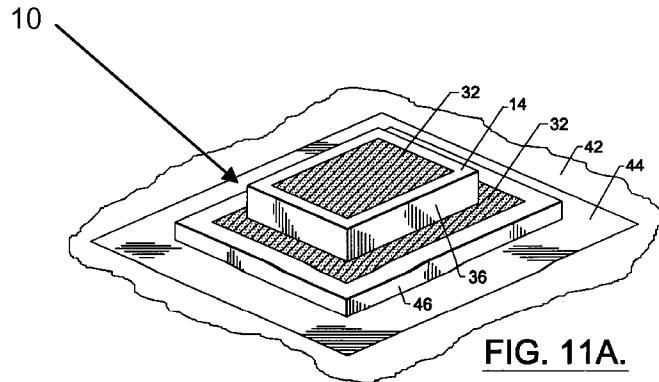


FIG. 11A.

After curing, Zappella's method further includes:

- 3) Removing the substrate 10 and the supporting material 32 from the work surface 42 such that subsequent manufacturing processes may be performed on the substrate 10 (see Col. 11, lines 40-44).

Figs. 8A and 8B (below) illustrate the substrate 10 removed from the work surface 42 (shown in Fig. 11A) and inverted (as indicated by the arrows) such that subsequent manufacturing may be accomplished on the first surface 12 and coplanar surface 38, as required by step 250 in Fig. 10. The method of Zappella also includes:

- 4) "depositing a layer of material 34 **on the first surface 12** of the micro-electronic substrate 10 and **at least a portion of the surface 38** of the supporting material 32 that is coplanar with the first surface 12 of the micro-electronic device 10" (Col., 11, lines 45-49). This step is clearly shown in Figs. 8A and 8B.

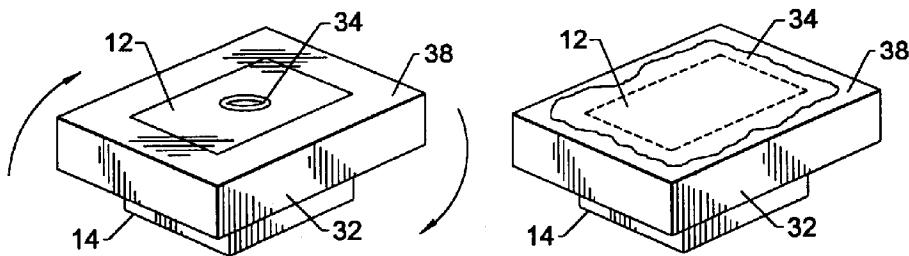


FIG. 8A.

FIG. 8B.

As illustrated in Figs. 8A and 8B, the second surface 14 (having the cavity 16 filled with support material 32) defined therein **does not have** the additional material layer 34 established thereon. **Zappella neither teaches nor suggests that the layer 34 is established on the second surface 14 or on the support material 32 in the cavity 16.** As such, Appellants respectfully submit that their invention, as defined in claim 1, is distinguishable from Zappella, at least in part because the material layer 34 of Zappella is not applied on the second surface 14 of the substrate, which has the depression (or cavity 16) defined therein. As shown in the Figures above, the material layer 34 of Zappella is applied to the surface 12 that is **opposite** to the surface 14 having the cavity defined therein.

Appellants reiterate that the method of Zappella is in sharp contrast to Appellants' invention as defined in claim 1, which (as outlined above) recites that the layer 338 is established "on the prepared outer surface of the solidified bifunctional core material and a portion of the substrate surrounding the depression." Appellants are clearly establishing the layer 338 (allegedly equivalent to Zappella's material layer 34) on the core material 334 that is located in a depression formed in the substrate 314 and on a surface of the substrate 314 surrounding the depression, not on an opposed surface of the substrate (as taught in Zappella).

Appellants further submit that Zappella does not teach or suggest forming a chamber between the substrate and the layer by application of the layer to the core material that is established in a depression of the substrate. In fact, Zappella's planar

material layer 34 is in sharp contrast to Appellants' layer in claim 1, which states in part, "establishing a layer on the prepared outer surface of the solidified bifunctional core material and a portion of the substrate **surrounding the depression**, the established layer and the substrate **defining a chamber**." The teachings of Zappella do not apply a material layer to the portion of the substrate ***surrounding the cavity***, nor does it form a chamber. Rather, the essence of Zappella is that the material layer 34 is applied to the first surface 12 of the substrate 10 and to the support material 32 that is coplanar (i.e., layer 38) with the first surface 12. This ***planar*** surface is clearly not a cavity. (See Col. 3, lines 19-22; Fig. 8B (reproduced above)). In fact, the cavity 16 of Zappella is located in the surface 14 opposite the first and coplanar surfaces 12, 38.

Furthermore, Appellants submit that one skilled in the art would not be led to provide the layer of Zappella (e.g., flowable material 34) over the supporting material 32 in the cavity 16. The additional material layer 34 taught in Zappella is deposited directly on the planar surface of the micro-electronic substrate such that the layer 34 may be patterned to precisely define conductive pads, traces and/or interconnects/bumps that are to be **deposited on the micro-electronic substrate**. Incorporating the additional material layer 34 on the supporting material 32 in the cavity 16 would not achieve this goal. Furthermore, it is submitted that the formation of conductive pads, traces and/or interconnects/bumps would not be particularly useful if deposited on the supporting material 32 in the cavity 16.

The Board's attention is now directed to rejected claim 24. Appellants' claim 24 recites:

A process for making an optical microelectromechanical device, comprising:
introducing a bifunctional core material into a cavity defined in a substrate; and
establishing a layer on the bifunctional core material and the substrate, the layer and substrate defining a sealed chamber therebetween.

Independent claim 24 clearly sets forth that the bifunctional core material is in a cavity defined in a substrate, and that the layer is established such that a sealed chamber is defined between the layer and the substrate. Claim 24 includes a similar method step as claim 1, which states, “establishing a layer on the bifunctional core material and the substrate, **the layer and substrate defining a sealed chamber** therebetween.” Appellants’ invention as defined in claim 24 is not anticipated by, or rendered obvious in view of Zappella, at least in part because Zappella does not teach or suggest the formation of a sealed chamber. For all of the reasons and arguments presented above for independent claim 1, Appellants submit that independent claim 24 is also distinguishable from Zappella.

For all the reasons stated above, it is submitted that Appellants’ method as defined in independent claims 1 and 24, and those claims depending ultimately therefrom, is not anticipated, taught, or rendered obvious by Zappella, either alone or in combination, and patentably defines over the art of record.

SUMMARY

The Appellants respectfully submit that claims 1-16 and 24-31 as currently pending fully satisfy the requirements of 35 U.S.C. §§ 102, 103 and 112. In view of the foregoing, favorable consideration and passage to issue of the present application is respectfully requested. If any points remain in issue that may best be resolved through a personal or telephonic interview, the Examiner is respectfully requested to contact the undersigned at the telephone number listed below.

Respectfully submitted,

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VIII. CLAIMS APPENDIX

1. (Previously presented) A method for forming a chamber in an electronic device, the method comprising:

preparing an outer surface on a solidified bifunctional core material, the solidified bifunctional core material in a depression formed in a substrate; and establishing a layer on the prepared outer surface of the solidified bifunctional core material and a portion of the substrate surrounding the depression, the established layer and the substrate defining a chamber.

2. (Original) The method of claim 1 wherein the established layer is composed of an optically transmissive material.

3. (Original) The method of claim 1 wherein the substrate is one of a semiconductor material and an optically transmissive material.

4. (Previously presented) The method of claim 1 wherein the bifunctional core material exhibits a solidified state at a first temperature and a fluidized state at a second temperature greater than the first temperature.

5. (Previously presented) The method of claim 1 wherein prior to preparing the outer surface, the method further comprises solidifying the bifunctional core material by at least one of temperature change, polymerization, and cross-linking.

6. (Previously presented) The method of claim 1 wherein the core material contains at least one of low melting waxes, naphthalene, naphthalene derivatives, acrylic monomers, acrylic polymers, camphor, camphor derivatives, camphinic acid polymers, polyesters, or mixtures thereof.

7. (Previously presented) The method of claim 1, further comprising converting the solidified bifunctional core material contained in the chamber into a fluidized bifunctional core material subsequent to establishing the layer.

8. (Previously presented) The method of claim 7, further comprising removing at least a portion of the fluidized bifunctional core material from the chamber subsequent to converting the solidified bifunctional core material.

9. (Previously presented) The method of claim 7, further comprising operating the electronic device with at least a portion of the fluidized bifunctional core material present in the chamber.

10. (Previously presented) The method of claim 1 wherein establishing the layer is accomplished by at least one of spin deposition or sputter deposition.

11. (Previously presented) The method of claim 1 wherein the layer is formed of an optical quality material, the optical quality material including at least one of acrylates, epoxies, polycarbonates, polyimides, TEOS, silicate, polycarbonate, magnesium fluoride, quartz, or glass.

12. (Previously presented) The method of claim 1, further comprising removing at least a portion of the bifunctional core material after the layer has been established.

13. (Previously presented) The method of claim 12 wherein removing comprises at least one of sublimation, solvent dissolution, melting, or gas purging.

14. (Previously presented) The method of claim 1 wherein the electronic device has a minimum operating temperature and wherein the bifunctional core material solidifies at a temperature below the minimum operating temperature for the electronic device.

15. (Previously presented) The method of claim 5, further comprising: positioning at least one microelectromechanical device in the depression, the positioning occurring prior to preparing the outer surface; and introducing the bifunctional core material into the depression such that the bifunctional core material and the depression are in conforming relationship to each other, the introducing occurring prior to the solidifying.

16. (Original) The method of claim 15 wherein the microelectromechanical device is an optic MEMS device.

17. – 23. (Cancelled)

24. (Original) A process for making an optical microelectromechanical device, comprising:

introducing a bifunctional core material into a cavity defined in a substrate; and

establishing a layer on the bifunctional core material and the substrate, the layer and substrate defining a sealed chamber therebetween.

25. (Original) The process of claim 24 wherein the layer has an optical quality including at least one of optical transmission, reflectance, and diffraction.

26. (Original) The process of claim 24 wherein the cavity contains a microelectromechanical device and the bifunctional core material is placed in comprehensive contact with the microelectromechanical device and conformal relationship with the cavity.

27. (Original) The process of claim 24 wherein the bifunctional core material has at least two physical states, the two physical states including at least a solidified state at a first condition and a fluidized state at a second condition.

28. (Original) The process of claim 27 wherein the first and second conditions are first and second temperatures, wherein the second temperature is greater than the first temperature, wherein the bifunctional core material is introduced at a temperature at least as great as the second temperature, and wherein the establishing occurs while the bifunctional core material is in the solidified state.

29. (Original) The process of claim 27, further comprising removing the bifunctional core material subsequent to establishing.

30. (Original) The process of claim 27, further comprising maintaining the bifunctional core material in the sealed chamber during operation of the device.

31. (Original) The process of claim 24, further comprising preparing a surface on an outer face of the bifunctional core material prior to establishing.

32. – 40. (Cancelled)

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IX. EVIDENCE APPENDIX

None.

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X. RELATED PROCEEDINGS APPENDIX

None.